doi:10.11659/jjssx.03E019184

·临床研究·

椎体后凸成形术联合小关节突封闭治疗单节段椎体压缩性骨折的临床疗效

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[摘 要] **目的** 探讨经皮穿刺椎体后凸成形术(PKP)联合小关节突封闭治疗老年单节段椎体压缩性骨折的临床效果。**方法** 收集2018年1月至2019年1月我院收治的单节段椎体压缩性骨折患者72例,按手术方式的不同分为对照组和观察组,分别行单纯PKP和PKP联合小关节突封闭手术。应用疼痛视觉模拟指数VAS评分、功能障碍指数ODI评分分别评估患者术前、术后即刻、术后24 h、术后72 h、术后1个月临床疗效。**结果** 观察组患者手术时间长于对照组,差异有统计学意义($P<0.05$);2组患者术前VAS及ODI评分比较差异无统计学意义($P>0.05$),术后各时间点VAS及ODI评分与术前相比均获得明显改善,差异有统计学意义($P<0.05$),观察组患者在术后即刻、术后24 h、术后72 h改善较对照组明显,差异有统计学意义($P<0.01$),但2组术后1个月VAS及ODI评分比较,差异无统计学意义($P>0.05$)。**结论** PKP联合小关节突封闭治疗老年人群单节段椎体压缩性骨折早期疼痛缓解程度更好,能更早下地活动,明显提高患者手术疗效,减少并发症。

[关键词] 骨质疏松;单节段;椎体压缩性骨折;椎体后凸成形术;小关节突封闭

[中图分类号] R683.2 [文献标识码] A [收稿日期] 2019-03-29

Clinical efficacy of percutaneous kyphoplasty combined with facet joint blocking in treatment of single-segment vertebral compression fractures

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Abstract: Objective To compare the clinical outcomes of percutaneous kyphoplasty (PKP) combined with facet joint blocking in the treatment of elderly single-segment vertebral compression fracture. **Methods** A total of 72 patients with single-segment vertebral compression fractures who were diagnosed in our hospital from January 2018 to January 2019 were randomly divided into the control group and the observation group. PKP and PKP combined with small facet joints were performed in control group and observation group respectively. The pain visual analogue index VAS score and dysfunction index ODI score were used to evaluate the clinical efficacy in preoperative, postoperative immediately, 24 hours, 72 hours and 1 month. **Results** The operation time of the observation group was longer than that of the control group, the difference was statistically significant ($P<0.05$). There was no significant difference between the two groups in the VAS and ODI scores before operation ($P>0.05$). The VAS and ODI scores were significantly improved compared with those before operation at all postoperative time points, and the difference was statistically significant ($P<0.05$). The improvement of the observation group was more obvious at postoperative immediately, 24 hours and 72 hours than those of control group, the difference was statistically significant ($P<0.01$), but there was no significant difference between the two groups at 1 month after surgery ($P>0.05$). **Conclusion** PKP combined with facet joint blocking for the treatment of single-segment vertebral compression fractures in the elderly has better relief of early pain, with the activity earlier, which can significantly improve the surgical outcome and reduce complications.

Keywords: osteoporosis; single segment; vertebral compression fracture; percutaneous kyphoplasty; facet joint blocking

骨质疏松性骨折(osteoporotic vertebral vompression fractures,OVCF)高发于50岁以上人群,尤其是绝经后中老年女性,可由轻微咳嗽、低能量外力或者姿势改变等引起,患者剧烈疼痛、长期卧床,严重影响其生活质量和生命安全[1]。老年胸腰椎压缩性骨折是常见的一类骨质疏松性骨折,目前多采取椎体后凸成形术(percutaneous kyphoplasty,PKP)进行治疗,已取得良好的临床疗效[2]。但临床观察发现,大部分患者术后仍存在较明显的残余腰背部疼痛,可能与骨折继发小关节突损伤有关[3-4]。治疗上主要采取对症处理,包括延长患者起床时间、口服或静脉给予止痛药物、二次给予封闭治疗等,对患者术后疗效影响较大。因此,术前通过影像学结果判断小关节突损伤程度,给予术中处理,临床疗效更佳。本研究回顾性分析我院2018年1月至2019年1月收治的72例单节段胸腰椎椎体压缩性骨折患者临床资料,探讨采用PKP联合小关节突封闭治疗单节段椎体压缩性骨折患者的临床疗效,现报告如下。

[基金项目] 重庆市卫生和计划生育委员会适宜卫生技术推广项目(2016jstg018);重庆市研究生科研创新基金(CYS16234)

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1 资料与方法

1.1 临床资料

选择我院2018年1月至2019年1月收治的单节段胸腰椎压缩性骨折患者72例,按手术方式的不同分为对照组和观察组,对照组采用单纯经皮穿刺椎体后凸成形术,观察组采用经皮穿刺椎体后凸成形术联合椎间小关节封闭。对照组36例,其中男14例,女22例;平均年龄(75.86±6.24)岁;下胸椎压缩性骨折21例,腰椎压缩性骨折15例。观察组36例,男15例,女21例;平均年龄(76.14±7.19)岁;其中下胸椎压缩性骨折24例,腰椎压缩性骨折12例。

纳入标准:①症状、体征及影像学提示新发椎体压缩性骨折,MRI证实脊髓无受压,小关节损伤符合Weishaupt分级(Ⅰ~Ⅲ级),分级标准见表1[5];②年龄大于60岁,发病至手术时间不超过2周;③椎体压缩度不小于1/3,且无明显的后壁破裂;④无相关手术禁忌证。排除标准:①爆裂性骨折;②代谢性骨病、肿瘤、结核及化脓性感染等引起的椎体骨折;③长期应用抗凝药物,停药时间不足;④老年痴呆、认知功能障碍;⑤骨折前存在肢体偏瘫或全瘫。本研究经重庆医科大学附属第二医院伦理委员会批准,患者及家属签署知情同意书。2组患者性别、年龄、发病时间等临床资料比较,差异无统计学意义($P>0.05$),具有可比性。

表1 腰椎小关节骨关节炎Weishaupt分级

分级	影像学表现
0级	正常小关节间隙(2~4 mm)
Ⅰ级	小关节间隙狭窄(<2 mm)和/或小骨赘和/或轻度关节增生
Ⅱ级	小关节间隙狭窄(<2 mm)和/或中度骨赘和/或中度关节增生和/或轻度关节面侵蚀
Ⅲ级	小关节间隙狭窄(<2 mm)和/或大骨赘和/或重度关节增生和/或重度关节面侵蚀和/或软骨下囊肿

1.2 手术方式

对照组行单纯经皮穿刺椎体后凸成形术。患者取俯卧位于弓型架手术床上,C型臂X射线机辅助定位伤椎椎弓根体表投影,同时体表标记,以该点向外侧旁开4~8 cm为穿刺点,穿刺点行2%利多卡因局部麻醉,麻醉达到腰背筋膜全层。以穿刺点为中心在皮肤上切约0.5 cm小切口,插入含配套通道的穿刺针至椎弓根外侧缘,在C型臂X射线机正侧位透视下再次确认穿刺针针尖位置,拔出针芯,沿通道进行穿刺点麻醉。重新放入针芯后沿椎弓根方向进针,使针头到达椎弓根内侧缘,侧位透视到达椎体后缘,拔出针芯,置入导针,建立骨水泥注射工作通道。使用压力注射装置球囊进行椎体适度撑开,当椎体高度恢复满意或球囊扩张至上下终板,回抽后撤出球囊,再沿通道进行骨水泥注入,以骨水泥弥散整个椎体为宜,骨水泥初步凝固后旋转导管数圈拔出,碘伏消毒后切口全层缝合1针,无菌敷料覆盖。观察组行经皮穿刺椎体后凸成形术联合小关节突封闭治疗,伤椎定位方式同对照组,将2% 利多卡因5 mL和复方倍氯米松1 mL配成混液,沿椎弓根体表投影点垂直进针,触及关节突骨质时缓慢注射,行小关节突封闭。其余手术操作同对照组。

1.3 术后处理

术后常规给予抗炎、脱水等治疗,不单独给予止痛处理,术后回病房后开始床上自由翻身活动,术后4 h家属辅助下床活动。

1.4 疗效观察

根据疼痛视觉模拟评分(visual analogue scales,VAS)量化标准(总分0~10分),获取2组患者术前、术后即刻、术后24 h、术后72 h、术后1个月VAS评分;同时进行功能障碍指数(oswestry disability index,ODI)评分。分析2组患者术前、术后即刻、术后24 h、术后72 h、术后1个月VAS、ODI评分的差异。

1.5 统计学方法

数据处理使用SPSS 23.0软件,计量资料采用独立样本t检验,以均数±标准差($\bar{x}\pm s$)表示,计数资料采用χ^2检验,检验水准$\alpha=0.05$,$P<0.05$表示差异有统计学意义。

2 结果

2.1 手术时间比较

2组手术均由同一手术医师主刀完成,手术过程顺利。观察组手术时间(34.06±4.96)min,明显长于对照组的(30.58±7.47)min,2组比较差异有统计学意义($P<0.05$)。

2.2 疼痛缓解情况比较

考虑切口也会引起疼痛,我们定义疼痛缓解程度达到90%为疼痛明显缓解。患者术后疼痛缓解率比较,观察组86%的患者明显缓解,与对照组的61%比较差异有统计学意义($\chi^2=11.31$,$P=0.03$),见表2。

表2 2组患者术后疼痛缓解情况比较[例(%),$n=36$]

组别	明显缓解	缓解不完全	未缓解
观察组	31(86)	3(8.3)	2(5.6)
对照组	22(61)	12(33.3)	2(5.6)

2.3 手术前后各时间点VAS及ODI评分比较

2组患者术前VAS及ODI评分比较,差异无统计学意义($P>0.05$);除术后即刻患者未下床活动,ODI不能进行评分之外,2组患者术后即刻、术后24 h、术后72 hVAS、ODI评分均获得良好的改善,与术前比

较,差异有统计学意义($P<0.05$),且观察组 ODI 评分明显低于对照组;然而术后 1 个月时 2 组 VAS、ODI 评分比较差异无统计学意义($P>0.05$),见表 3。

2.4 并发症比较

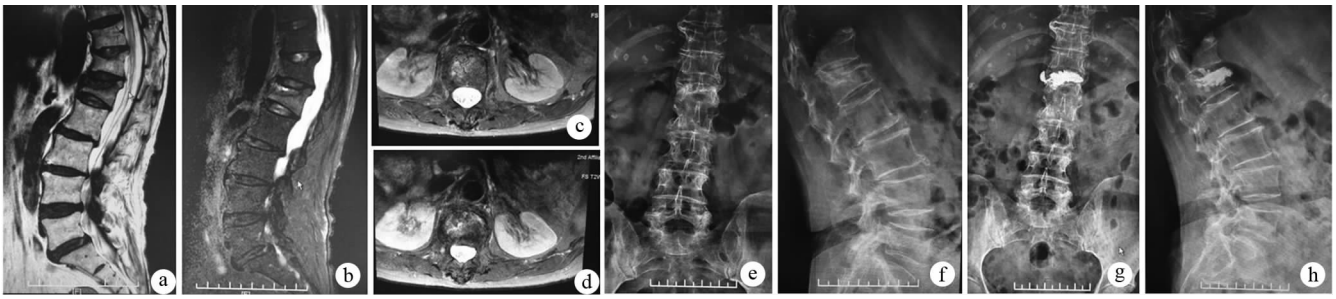
2 组患者骨水泥填充较好,均未出现骨水泥渗漏、穿刺部位感染、血肿等并发症。

表 3 2 组患者术前及术后各时间点 VAS、ODI 评分($\bar{x}\pm s$,$n=36$)

组别	术前		术后即刻	术后 24 h		术后 72 h		术后 1 个月	
	VAS(分)	ODI(%)	VAS(分)	VAS(分)	ODI(%)	VAS(分)	ODI(%)	VAS(分)	ODI(%)
观察组	6.58±0.96	49.66±7.01	1.36±0.68	1.38±0.49	32.02±5.65	1.30±0.62	28.27±4.03	1.11±0.57	20.91±3.51
对照组	6.75±0.93	50.61±6.74	2.61±0.64	3.05±0.71	40.13±6.53	2.86±0.76	32.38±4.78	1.33±0.67	19.83±2.36
P	0.46	0.562	0.00	0.00	0.00	0.00	0.00	0.137	0.129

2.5 典型病例

患者,女,75 岁,因跌倒致腰背部疼痛 5 d 入院,诊断:①L_1 椎体压缩性骨折;②T_{12}椎体陈旧性压缩性骨折;③腰椎侧弯;④高血压;⑤2 型糖尿病。行 L_1 椎体 PKP + $L_{1/2}$小关节突封闭。术前腰痛 VAS 评分 7 分,ODI 为 51%;术后 VAS 评分 1 分,ODI 为 26%。术后腰背部疼痛明显缓解,术后 2 h 下床活动(图 1)。



a:术前 MRI T2 加权成像;b:术前 MRI 抑制脂肪像;c、d:术前水平扫描小关节突损伤符合 Weishaupt 分级Ⅲ级;e、f:术前腰椎正侧位 X 射线片;g、h:术后腰椎正侧位 X 射线片

图 1 典型病例 L_1 椎体 PKP 联合小关节突封闭治疗手术前后影像学资料

3 讨论

骨质疏松症是目前影响老年人群健康的重要原因,尤其是绝经后老年妇女,随着年龄的增长,内分泌激素分泌异常,引起骨代谢紊乱,同时因为消化功能降低,导致成骨营养物质摄入减少,骨质大量流失,骨密度明显下降,容易引起骨质疏松性骨折[6]。骨质疏松性椎体压缩性骨折是最为常见的骨质疏松性骨折,表现为咳嗽、提重物后发生骨折,出现骨折原发部位腰背部疼痛,常常伴有腹胀、下腰部牵涉痛,翻身及活动后加重,卧床休息后缓解,严重影响患者生活质量[7-8]。

目前的治疗方式包括保守治疗和手术治疗[9]。保守治疗因卧床时间较长,存在椎体进一步压缩,易引起后凸或侧弯畸形、椎体向椎管压迫、卧床并发症等风险,逐渐被手术治疗替代。PKP 是目前应用最广的手术治疗方式,采用 0.5 ~ 1 cm 小切口,借助影像放射技术(C 型臂、G 型臂 X 射线机透视等),直接沿伤椎椎弓根进行穿刺,通过球囊扩张,可以尽可能恢复椎体高度,同时向椎体内注入骨水泥,达到椎体支撑和稳定的作用[10]。术后患者即可早期下床活动,避免了长期卧床引起的并发症,同时还有较好的止痛效果[10],其作用机制为:①骨水泥材料主要成分为聚甲基丙烯酸甲酯,在伤椎椎体内凝固的过程中会产生热效应(温度高达70 ℃),可有效烧灼椎体内部末梢神经,减轻疼痛症状;②骨水泥凝固后能够显著增强伤椎的机械稳定性和承载强度,从而恢复椎体内骨小梁形态,进一步降低椎体内压对于疼痛神经末梢的刺激[11]。然而,我们通过临床观察及查阅文献发现,PKP 术后患者腰背部疼痛症状可获得快速缓解,但大部分患者仍有明显的残余疼痛,影响患者早期下床活动,降低患者术后疗效,这与 PKP 术后仅恢复了伤椎椎体稳定性和高度,但对椎体后柱结构缺少必要的处理有关[12-13]。

椎体小关节突是椎体后柱的主要受力结构,由上位椎体下关节面、下位椎体上关节面组成,是构成椎体压力承载功能单元之一,椎体发生压缩性骨折时前中柱压缩性改变后,不可避免地导致后柱结构压力的增加,小关节突承受压力剧增,引起关节囊、关节软骨损伤[14]。继发小关节软骨下骨反应性增生、非特异性炎症反应,释放 5-羟色胺、缓激肽和 PE、IL-1、IL-6 等化学介质,这些化学介质使周围神经末梢敏感化,可以降低小关节上的痛觉感受器阈值,从而使其在受到较低的应力刺激时即可兴奋,并且维持持续的兴奋状态,有时甚至不需要机械刺激也可自发产生冲动[15]。而且,脊神经后支在下位椎体横突上缘与上关节突外侧分

叉,内侧支紧贴上关节突小关节囊,位置较为恒定,行小关节突封闭的同时可以阻滞内侧支。小关节突封闭治疗已被认为可以有效减轻小关节综合征引起的疼痛[16]。本研究选用的封闭治疗药物为利多卡因和复方倍他米松(得宝松),得宝松是一种可溶性和微溶性倍他米松脂复合制剂,能发挥较强的抗炎、维持内环境稳定、降低应激反应等作用,同时作用时间较长。本研究结果证实,伤椎小关节突封闭后患者疼痛缓解程度更高,其中86%的患者获得明显缓解。

Park 等[17]认为单纯小关节突封闭治疗即可有效地缓解腰背部疼痛,尤其是小关节突来源的疼痛。而且部分推荐保守治疗的医师认为,单纯的小关节突封闭结合保守治疗也能获得较好的临床疗效,同时还能避免 PKP/PVP 手术引起的并发症,比如骨水泥渗漏、骨水泥栓子等[18-19]。但其仅仅解决了小关节突来源的疼痛,对于椎体前方稳定及椎体内神经末梢未进行处理,术后疼痛不能缓解或缓解不完全,还存在椎体进一步压缩,出现后凸畸形,甚至引起椎管压迫的风险[20]。因此我们选择了行伤椎 PKP 的同时进行伤椎小关节突封闭治疗,可以同时处理前、中、后上三柱的损伤,本研究结果显示 PKP 结合小关节突封闭治疗的患者在术后即刻、术后 24 h、术后 72 h 较对照组获得更好的疼痛缓解效果,疼痛缓解更彻底。

综上,PKP 联合小关节突封闭治疗老年人群椎体压缩性骨折,术后早期疼痛缓解更佳,缩短下地活动时间,获得更好的早期临床疗效,同时可以减少长期卧床并发症。但随着骨愈合的进展,术后 1 个月 2 组患者的临床疗效一致。因此,尽管 PKP 联合小关节突封闭会稍增长手术时间,本研究认为对于老年单节段椎体压缩性骨折选择行 PKP 联合小关节突封闭治疗,可明显提高手术疗效。

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doi:10.11659/jjssx.10E018064

·临床研究·

基于 PACS 下颈椎侧块钉道长度的影像学三维测量及影响因素分析

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[摘 要] **目的** 基于影像归档和通信系统(PACS)测量下颈椎侧块钉道长度并分析其影响因素,为临床置钉提供指导。**方法** 选取 2016 年 12 月至 2017 年 12 月因颈椎退变或外伤于中国人民解放军北部战区总医院行颈椎手术的 100 例患者,收集术前颈椎三维 CT 数据并上传至 PACS,测量 C_3 ~ C_6 侧块(LMS)钉道长度,根据身高、体质量、性别、年龄、病因及 BMI 等因素将其分组并进行比较分析。**结果** 下颈椎 C_3 ~ C_6 LMS 平均钉道长度为(14.58 ± 1.20)mm,与以往研究测量结果基本一致。男、女组 LMS 平均钉道长度分别为(14.81 ± 1.17)mm、(14.00 ± 0.28)mm,两者比较差异有统计学意义(P < 0.05)。高体质量组和低体质量组 LMS 平均钉道长度分别为(14.84 ± 0.17)mm、(14.30 ± 0.17)mm,两者比较差异有统计学意义(P < 0.05)。不同身高组、病因组、年龄组测量结果显示 C_3 ~ C_6 部分节段差异有统计学意义(P < 0.05)。不同 BMI 组 LMS 钉道长度接近,差异无统计学意义(P > 0.05)。**结论** 性别、体质量是 LMS 钉道长度的影响因素,身高、年龄、病因对部分节段 LMS 钉道长度有影响,可为临床侧块螺钉置钉提供指导。

[关键词] 下颈椎;侧块螺钉;影像学测量;通信系统;颈椎疾病

[中图分类号] R681.5 +3 [文献标识码] A [收稿日期] 2018-10-20

Three-dimensional imaging measurement and analysis of affecting factors for the length of lateral mass screw in lower cervical spine based on the PACS

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Abstract: Objective To measure the length of lateral mass screw(LMS) in lower cervical spine based on the PACS and analyze the affecting factors to provide guidance for clinical screw placement. **Methods** A total of 100 patients diagnosed with traumatic cervical spine injury or degenerative cervical diseases who underwent cervical spine surgery in general hospital of northern theater command of PLA from December 2016 to December 2017 were selected, and harvested all the data of preoperative patients' three-dimensional cervical CT scan and sent them to PACS. The length of LMS from C_3 to C_6 was gauged separately, then patients were divided into different groups by height, weight, gender, age, pathogenesis and BMI and the data from different groups were compared and analyzed. **Results** The mean length of LMS from C_3 to C_6 was (14.58 ± 1.20) mm, which was consistent with researches before. The mean length of LMS in male and female respectively were (14.81 ± 1.17) mm and (14.00 ± 0.28) mm, the difference was significant (P < 0.05). The mean length of group high and group low divided by weight separately were (14.84 ± 0.17) mm and (14.30 ± 0.17) mm, the difference was significant (P < 0.05). However, the mean length of LMS among those different groups divided by height, age and pathogenesis were not different completely, but for the BMI group, there was no difference (P > 0.05). **Conclusion** Gender and weight are affecting factors of length of LMS in subaxial cervical spine, and the length of segmental LMS is affected by height, age and pathogenesis, which can be instructive for the clinical screw placement of LMS.

Keywords: subaxial cervical spine; lateral mass screw; imaging measurement; picture archiving and communication system; cervical spondylosis

[基金项目] 辽宁省社发攻关及成果产业化项目(2014225012)

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(编辑:陈庆利)